

Enzymes of Digestive system

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Enzymes for carbohydrate digestion

- Salivary Amylase
- Pancreatic Amylase
- Isomaltase
- Sucrase
- Lactase
- Trehalase
- Maltase

Enzymes for Protein digestion

- Pepsin
- Renin
- Trypsin
- Chymotrypsin
- Elastase
- Carboxypeptidase

Enzymes for Protein digestion

- Lingual lipase
- Acid stable lipase
- Gastric lipase
- Pancreatic lipase
- Cholesterol esterase
- Phospholipase

Digestion of Carbohydrates

- Major dietary carbohydrates: Starch, Glycogen, Sucrose, Lactose, Trehalose, Cellulose.

Digestion in mouth

Carbohydrate digestion starts in mouth.

Starch, Glycogen, Dextrins



Digested by Salivary Amylase



Maltose, Maltriose, α -limit dextrin

Carbohydrate digestion in stomach

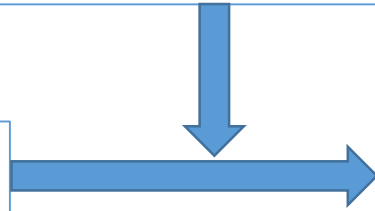
- Gastric HCl → inactivate Salivary amylase → No carbohydrate digestion in stomach.

Carbohydrate digestion in S. intestine

Acidic chyme is neutralized by HCO_3^- .

Pancreatic Amylase

Starch, Glycogen, Dextrins



Maltose, Maltriose, α -limit dextrin

Isomaltase: Hydrolyse α -1,6-glycosidic bond in α -limit dextrin

Maltase

Maltose



Glucose + Glucose

Sucrase

Sucrose



Glucose + Fructose

Lactase

Lactose



Glucose + Galactose

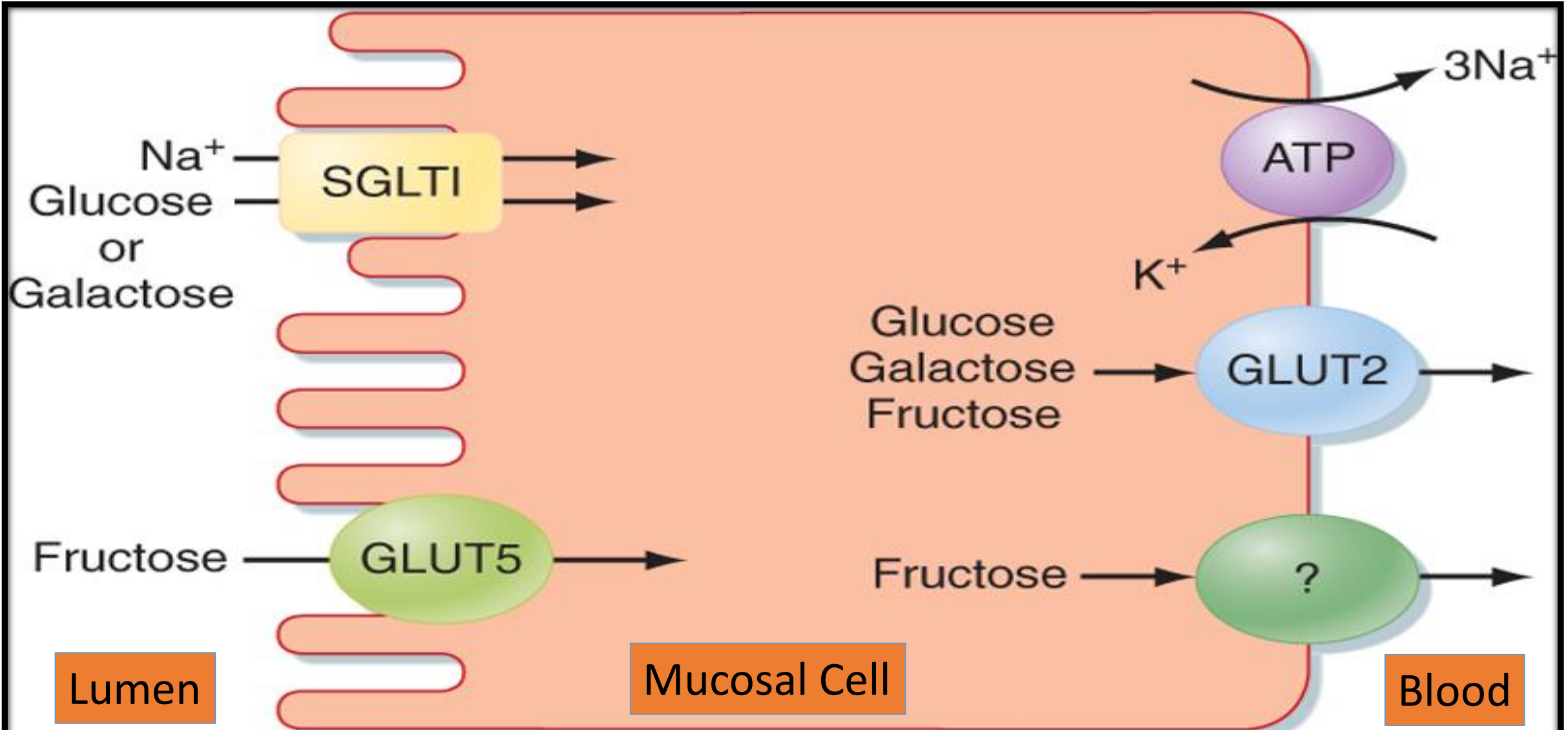
Trehalase

Trehalose



Glucose + Glucose

Mechanism of absorption



Digestion of Lipids

- **Major dietary lipids: TG [major], Cholesterol, CE, PL, FFA.**

Digestion in mouth

- Lingual lipase: Not of significance in human.

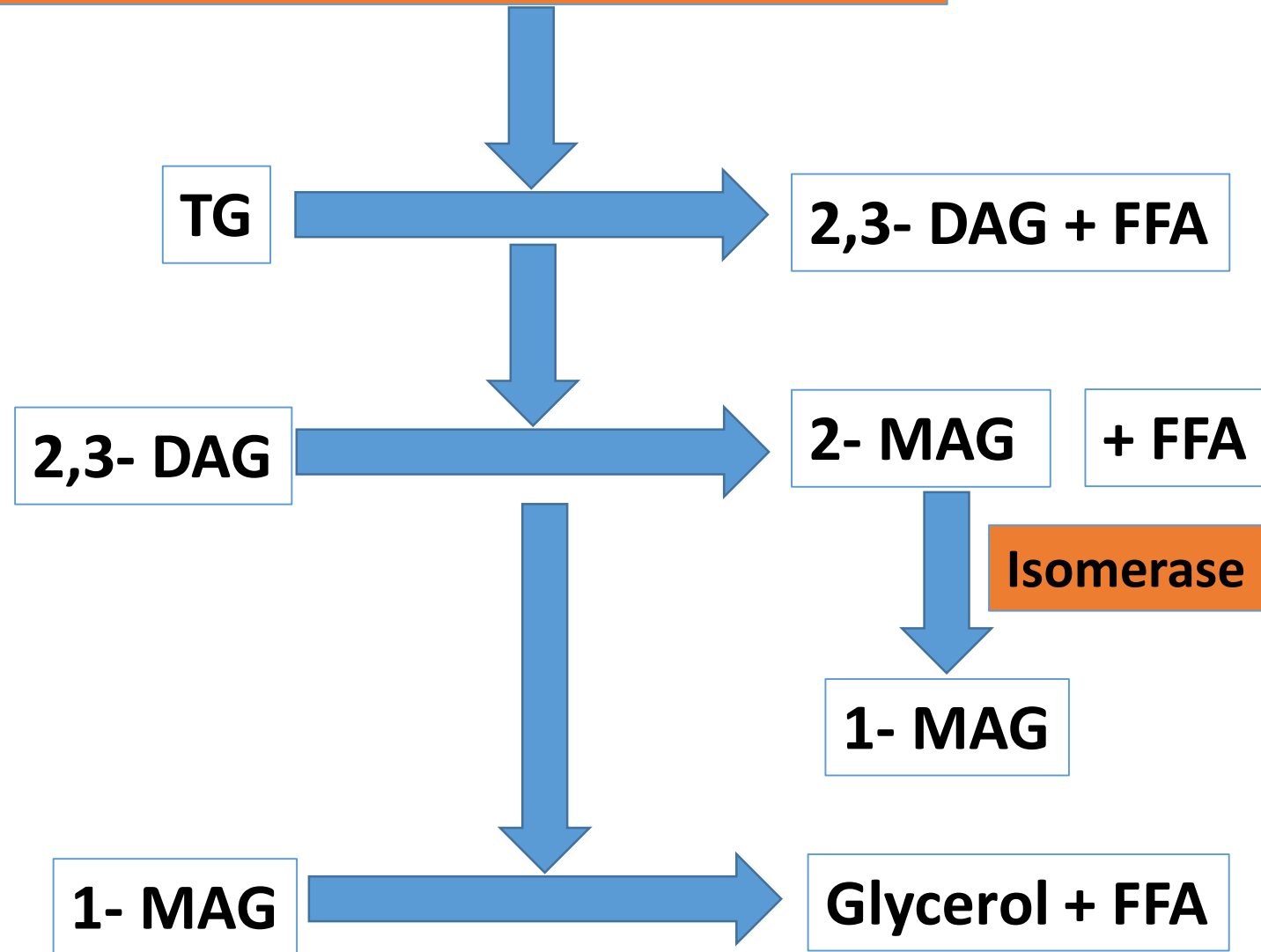
Digestion in stomach

- Enzymes: Acid stable lipase & Gastric lipase
 - Both enzymes are acid-stable [optimum pH 4 to 6]
 - Action is minimal: TG containing short or medium-chain FA.

Digestion in intestine

- Chyme enters duodenum → stimulate enteric hormones.
 - ❑ Cholecystikinin: Contract GB → Bile salt released into S. intestine.
 - ❑ Secretin: Stimulate pancreas to release Pancreatic juice
- Emulsification by Bile Salt :
 - Site: duodenum.
 - Emulsification → Increases surface area → digestive enzymes can act effectively.

TG degradation by pancreatic lipase



Cholesterol esterase

Cholesterol ester

Cholesterol + FFA

Phospholipase A₂

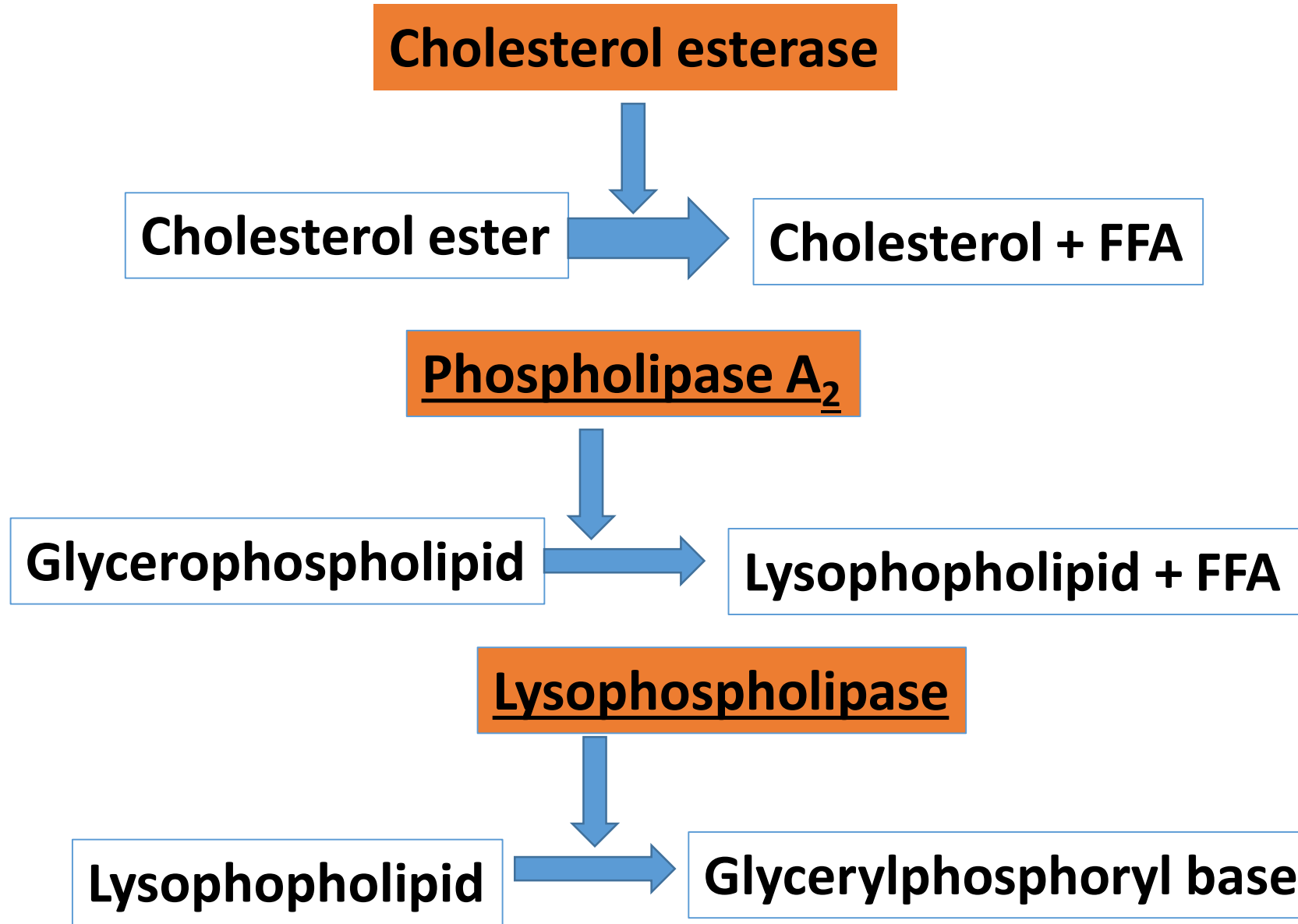
Glycerophospholipid

Lysophospholipid + FFA

Lysophospholipase

Lysophospholipid

Glycerylphosphoryl base



- Products of lipid digestion (FFA, FC, 2-MAG, Glycerol, lysophospholipid) together with bile salts & fat soluble vitamins form mixed micelles → aligned at brush border membrane of enterocyte.

Bile salts return to liver via enterohepatic circulation.

Events in Mucosal Cell



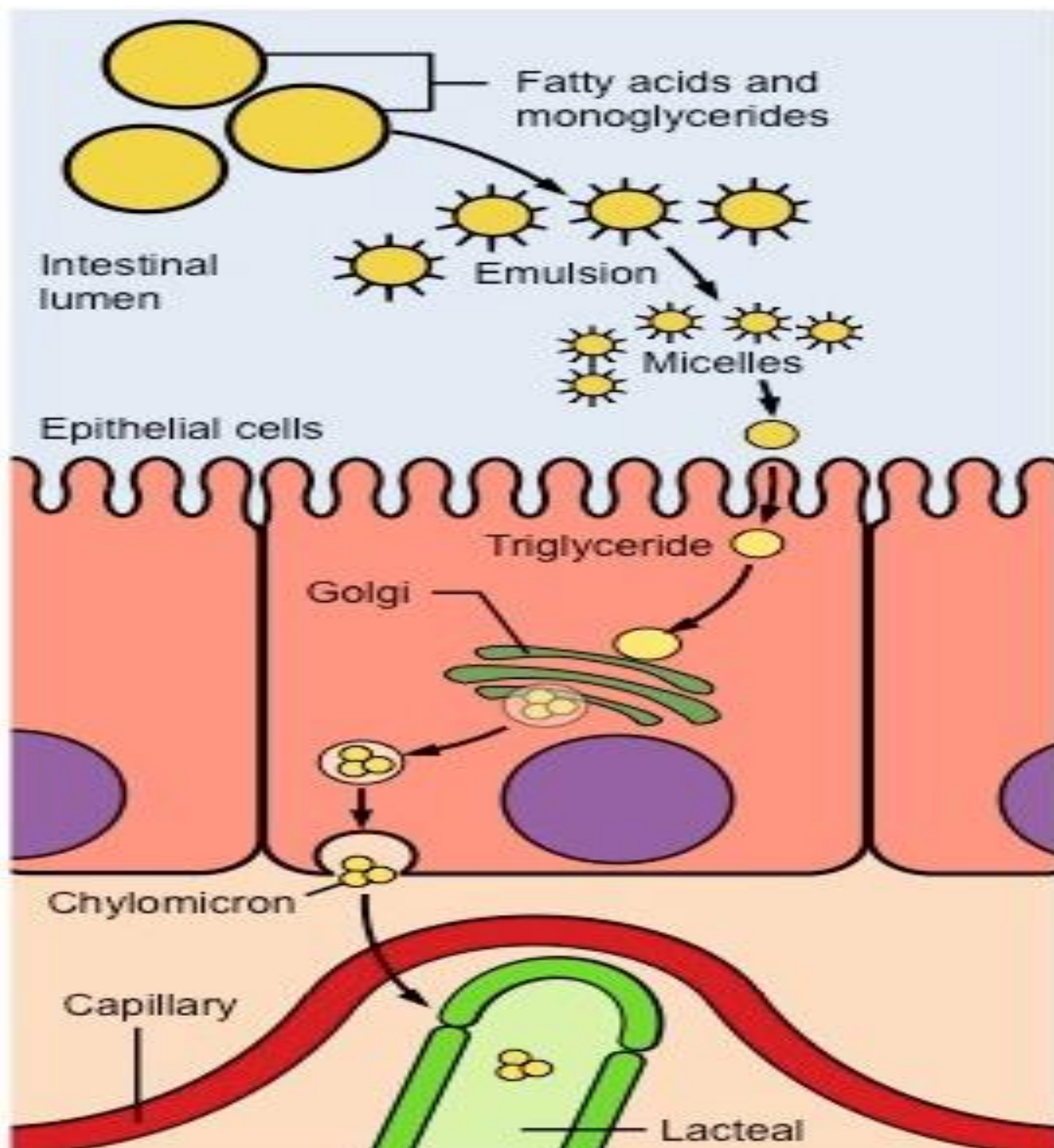
Re-esterification



Chylomicron



Released into blood



Fatty acids and monoglycerides are emulsified by bile salts to form micelles

Fatty acids enter the epithelial cells and link to form triglycerides

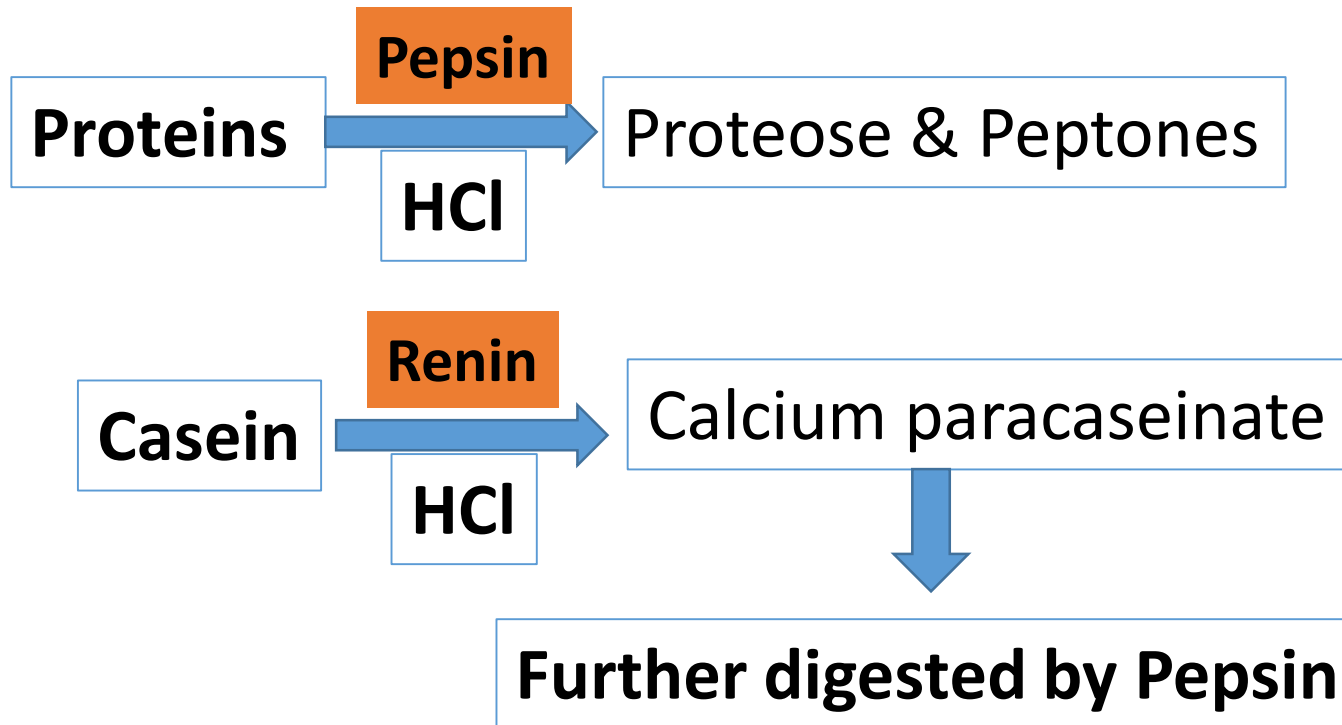
Triglycerides combine with proteins inside the Golgi body to form chylomicrons

Chylomicrons enter the lacteal and are transported away from the intestine

Digestion of proteins

Digestion in Mouth: No protein digestion in mouth.

Digestion in Stomach:



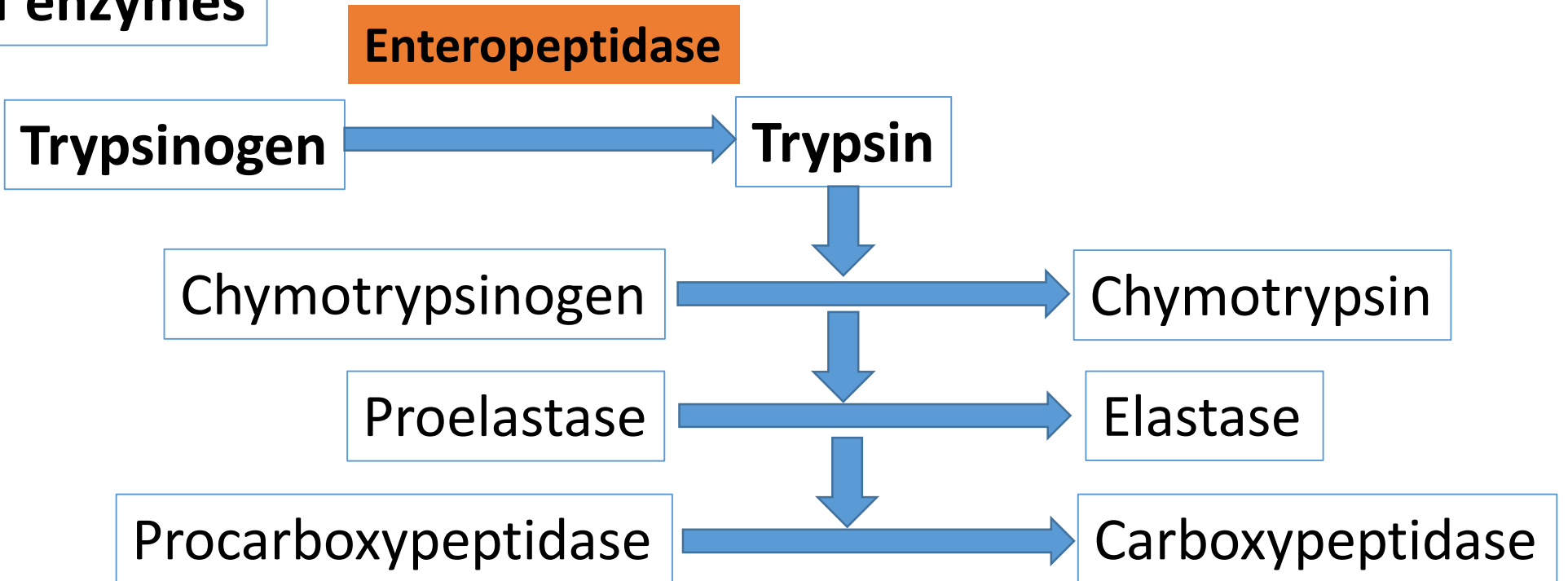
Functions of HCl

- Denaturation of proteins
- Killing of certain microorganism
- Required for optimum activity of enzymes.

Digestion of proteins

Digestion in Small intestine:

Activation of enzymes



Digestion of proteins

Digestion in Small intestine:

Proteoses & peptones

Trypsin
Chymotrypsin
Elastase

Polypeptides + Oligopeptides

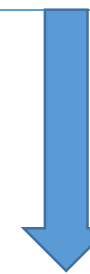
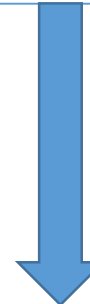
Carboxypeptidases
Aminopeptidases

Dipeptides

+ Amino acids

Dipeptidases

Amino acids



Absorption of amino acid

**Active transport
of Amino acids**

